



Carbon Monoxide (CO) Poisoning Investigation Guideline

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Revision History:

Date	Replaced	Comments
08/2018		Released

Carbon Monoxide Poisoning Investigation Guideline

CASE DEFINITION

Criteria for Case Investigation and Management:

Suspected carbon monoxide (CO) poisoning reported to KDHE will be investigated by KDHE environmental health epidemiologist, or local health department staff if the local health department has chosen to opt out of KDHE staff investigating cases in their jurisdiction, when the suspected case is:

- Non-fire related AND
- Accidental AND
- Exposure took place at a public location

LABORATORY ANALYSIS

For any patient where CO poisoning is suspected, results of blood carboxyhemoglobin tests should be sent to the Kansas Department of Health and Environment (KDHE).

Laboratory confirmation of CO poisoning includes:

- Person does not Smoke or Person Age < 14 with Unknown Smoking Status
 - Suspect CO poisoning case: COHb level $\geq 2.5\%$ and < 5%
 - Confirmed CO poisoning case: COHb level $\geq 5\%$
- Person Smokes or Person Age ≥ 14 with Unknown Smoking Status
 - Suspect CO poisoning case: COHb level $\geq 7\%$ and < 9%
 - Probable CO poisoning case: COHb level $\geq 9\%$ and < 12%
 - Confirmed CO poisoning case: COHb level $\geq 12\%$

EPIDEMIOLOGY

According to the Centers for Disease Control and Prevention, approximately 438 people in the United States die each year from unintentional, non-fire related exposure to CO. In Kansas, at least 28 unintentional CO poisoning deaths have occurred over the past 10 years (1). Thousands across the US require emergency medical care for CO poisoning. Men are more likely to be poisoned by CO than women, particularly in disaster-related CO poisoning, due to working in enclosed areas with internal combustion engines or improperly vented heating devices (2).

DISEASE OVERVIEW

A. Agent:

CO is an odorless, colorless gas that is given off when fossil fuels are burned. CO can build up from fumes from cars, portable generators, stoves, gas ranges, and heating systems if there is not adequate ventilation to fresh air.

B. Clinical Description:

Breathing CO can cause fatigue, headache, dizziness, and nausea. Signs of CO poisoning may include elevated pulse CO-oximetry. Very high levels of CO can even cause unconsciousness and death. Survivors of CO poisoning can have long-term health problems. Those that have exposure to moderate and high levels of CO over long periods of time have been linked to an increased risk of cardiovascular disease (3).

C. Routes of exposure:

Inhalation of air with high levels of CO.

D. Treatment:

If symptoms of CO poisoning are experienced, fresh air should be sought immediately. Emergency medical help is necessary for CO poisoning. Once at a hospital, CO poisoning treatment may include breathing pure oxygen or hyperbaric oxygen therapy. To breathe pure oxygen, a mask is placed over the nose and mouth to help oxygen reach organs and tissues. Hyperbaric oxygen therapy involves breathing pure oxygen in a chamber with higher air pressure than normal to accelerate the replacement of CO with oxygen in the blood. Hyperbaric oxygen therapy is used in more severe cases of CO poisoning or for those that are more susceptible to experiencing damage from CO poisoning.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

Anyone licensed to practice the healing arts or engaged in a post-graduate training program approved by the state board of healing arts, licensed dentists, licensed professional nurses, licenses practical nurses, administrators of hospitals, licensed adult care home administrators, licensed physician assistants, licensed social workers, teachers or school administrators, and anyone that oversees a laboratory are required to report all suspected CO poisoning cases. All suspected cases of CO poisoning should be reported regardless of lab results.

To notify public health authorities, fax a Kansas Carbon Monoxide Poisoning Reporting Form and any lab results to your local health department or to KDHE: 877-427-7318 within 24 hours of suspecting a case. If the 24-hour reporting period ends on a weekend or a state approved holiday, the report can be made by 5:00pm on the next business day.

CO Poisoning Reporting Form is available at:

http://www.kdheks.gov/epi/disease_reporting.html

**Kansas Department of Health and Environment (KDHE)
Bureau of Epidemiology and Public Health Informatics (BEPHI)**

Phone: 1-877-427-7317

Fax: 1-877-427-7318

INVESTIGATOR RESPONSIBILITIES

Definition: Suspected CO poisoning reported to KDHE is investigated by a KDHE epidemiologist, or local health department staff if the local health department has chosen to opt out of KDHE staff investigating cases in their jurisdiction, when the suspected case is:

- Non-fire related AND
- Accidental AND
- Exposure took place at a public location or an apartment building

If a local health department would like to opt out of KDHE investigating carbon monoxide poisoning cases in their jurisdiction and would rather investigate suspect cases at the local level, please contact KDHE via the Epidemiology Hotline at 1-877-427-7317 and notify the epidemiologist on call.

All notifications of a suspected CO poisoning should be entered into EpiTrax for surveillance purposes. Search EpiTrax for the patient name, date of birth, and carbon monoxide poisoning as the disease type. If the patient information has been received via Electronic Laboratory Reporting and the patient is in EpiTrax, review information and determine if the case is non-fire related AND accidental AND the exposure took place at a public location.

- If the patient does not exist in EpiTrax for carbon monoxide poisoning, create a new CMR by:
- Selecting New CMR at the top of EpiTrax.

NEW CMR

- Search for the patient.

Before creating a new morbidity event, please search for the person in question.

Last name	First name	Birth date	Items per page	
<input type="text" value="Smith"/>	<input type="text" value="John"/>	<input type="text" value="January 1, 2018"/>	<input type="text" value="25"/>	<input type="button" value="Search"/>

- If the patient exists in EpiTrax, select Create and edit CMR using this person under the Entity Actions column.

Create and edit CMR using this person

- If the patient does not exist in EpiTrax, select Start a CMR with the criteria you searched on.

Start a CMR with the criteria you searched on

- 1) If the case meets the criteria for investigation, proceed to step 1. If the case does not meet criteria for investigation, route to “Statewide carbon monoxide poisoning” as the jurisdiction. Save and Exit the case.
 - If the case is a resident of a county that has opted out, KDHE will route the case to the local health department jurisdiction.

2) Go to the **Investigation** tab.

Demographic	Clinical	Laboratory	Contacts	Encounters	Epidemiological	Reporting	Investigation	Notes	Administrative
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- 3) You should see the Kansas Carbon Monoxide Poisoning Investigation Form in use.

Forms in Use Kansas Carbon Monoxide Poisoning Investigation Form Add/Remove forms for this event	Forms Kansas Carbon Monoxide Poisoning Investigation Form Interview Attempts Patient Information Interviewee Information Exposure Information Medical Information Additional People Present at Time of Exposure Fire Marshal/Fire Department Case Classification
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NOTE: If you are creating a new CMR, add the Kansas Carbon Monoxide Poisoning Investigation Form by:

- Select Add/Remove forms for this event.

Investigative Information [Hide]

Forms in Use

None

Add/Remove forms for this event

[↑ Return to top](#)

- Find the Kansas Carbon Monoxide Poisoning Investigation Form and check the selection box.

Kansas Carbon Monoxide Poisoning Investigation Form Kansas Carbon Monoxide Poisoning Investigation Form	Carbon Monoxide Poisoning	Allen County Anderson County Atchison County Barber County	Morbidity Event <input checked="" type="checkbox"/>
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- Scroll to the bottom of the page and select Add Forms.

Add Forms

- 4) Make sure you are in edit mode. In the **Interview Attempts** tab, fill out the interview attempt being completed.

5) In the **Patient Information tab**, complete information using the CO intake form.

Forms

Kansas Carbon Monoxide Poisoning Investigation Form

Interview Attempts	Patient Information	Interviewee Information	Exposure Information	Medical Information	Additional People Present at Time of Exposure	Fire Marshal\Fire Department
Case Classification						

Conduct short telephone interview. Confirm Patient Information by verifying the following information:

- Name of patient and correct spelling
- Phone number
- Address
- Date of birth
- Race
- Ethnicity
- Sex
- If sex is female, whether pregnant

6) In the **Interviewee Information tab**, record interviewee information if it is different from the patient information.

Forms

Kansas Carbon Monoxide Poisoning Investigation Form

Interview Attempts	Patient Information	Interviewee Information	Exposure Information	Medical Information	Additional People Present at Time of Exposure	Fire Marshal\Fire Department
Case Classification						

If the interviewee is the patient, mark, “Yes” under Information is the same as patient.

Information is the same as patient:

☐ Yes

☐ No

7) During interview, complete information in **Exposure Information tab**.

Forms

Kansas Carbon Monoxide Poisoning Investigation Form

Interview Attempts	Patient Information	Interviewee Information	Exposure Information	Medical Information	Additional People Present at Time of Exposure	Fire Marshal\Fire Department
Case Classification						

8) During interview, complete information in **Medical Information tab**.

Forms

Kansas Carbon Monoxide Poisoning Investigation Form

Interview Attempts	Patient Information	Interviewee Information	Exposure Information	Medical Information	Additional People Present at Time of Exposure	Fire Marshal\Fire Department
Case Classification						

- 9) If there were other people exposed to CO from this event, complete **Additional People Present at Time of Exposure tab**. This will conclude this interview.

Forms

Kansas Carbon Monoxide Poisoning Investigation Form

Interview Attempts	Patient Information	Interviewee Information	Exposure Information	Medical Information	Additional People Present at Time of Exposure	Fire Marshal/Fire Department
Case Classification						

- 10) Using the **Fire Marshal/Fire Department tab**, complete interview with Fire Marshall or Fire Department representative.

Forms

Kansas Carbon Monoxide Poisoning Investigation Form

Interview Attempts	Patient Information	Interviewee Information	Exposure Information	Medical Information	Additional People Present at Time of Exposure	Fire Marshal/Fire Department
Case Classification						

- 11) Under the Case Classification tab, classify the case using the Carbon Monoxide Case Classification Algorithm ([Appendix A](#) and [Appendix B](#)).

- Skip this step if you are a local health department. KDHE staff will classify cases.

Forms

Kansas Carbon Monoxide Poisoning Investigation Form

Interview Attempts	Patient Information	Interviewee Information	Exposure Information	Medical Information	Additional People Present at Time of Exposure	Fire Marshal/Fire Department
Case Classification						

- 12) Record actions completed and additional information in the “Notes” section of the case in EpiTrax.

Demographic	Clinical	Laboratory	Contacts	Encounters	Epidemiological	Reporting	Investigation	Notes	Administrative
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- 13) Make sure to click Save & Exit before exiting EpiTrax.

EDIT MORBIDITY EVENT	Save & Continue	Save & Exit
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DATA MANAGEMENT AND REPORTING TO THE KDHE

A. Data collection tools:

- Organize and collect data, using appropriate data collection tools including the Kansas Carbon Monoxide Poisoning Investigation Form to collect information.

B. Data reporting using EpiTrax:

- Report data collected during the investigation via EpiTrax.
- Verify that all data requested has been recorded on an appropriate EpiTrax tab, or that actions are completed for a case lost to follow-up as outlined below.
- Some data that cannot be reported on an EpiTrax tab may need to be recorded in Notes or scanned and attached to the record.
- Paper report forms do not need to be sent to KDHE after the information is recorded and/or attached in EpiTrax. The forms should be handled as directed by local administrative practices.

C. Cases lost to follow-up:

- If a case is lost to follow-up, after the appropriate attempts to contact the case have been made:
 - Indicate 'lost to follow-up' with the reason on the Notes tab with the number of attempts to contact the case recorded in the Interview Attempts tab within the interview form.
 - Record at least the information that was collected from the initial reporter.

D. Investigation completion:

- After the requirements listed under Case Investigation have been completed, record the Interview Date and Interview Completed By in the Interview Attempts tab.
- Once the entire investigation is completed, the LHD investigator will click the "Complete" button on the Administrative tab. This will trigger an alert to the LHD Administrator, so they can review the case before sending to the state.
- The LHD Administrator will then "Approve" or "Reject" the CMR.
- Once a case is "Approved" by the LHD Administrator, KDHE staff will review and close the case after ensuring it is complete and that the case is assigned to the correct event, based on the reported symptoms reported. (Review the EpiTrax User Guide, Case Routing for further guidance.)

REFERRALS

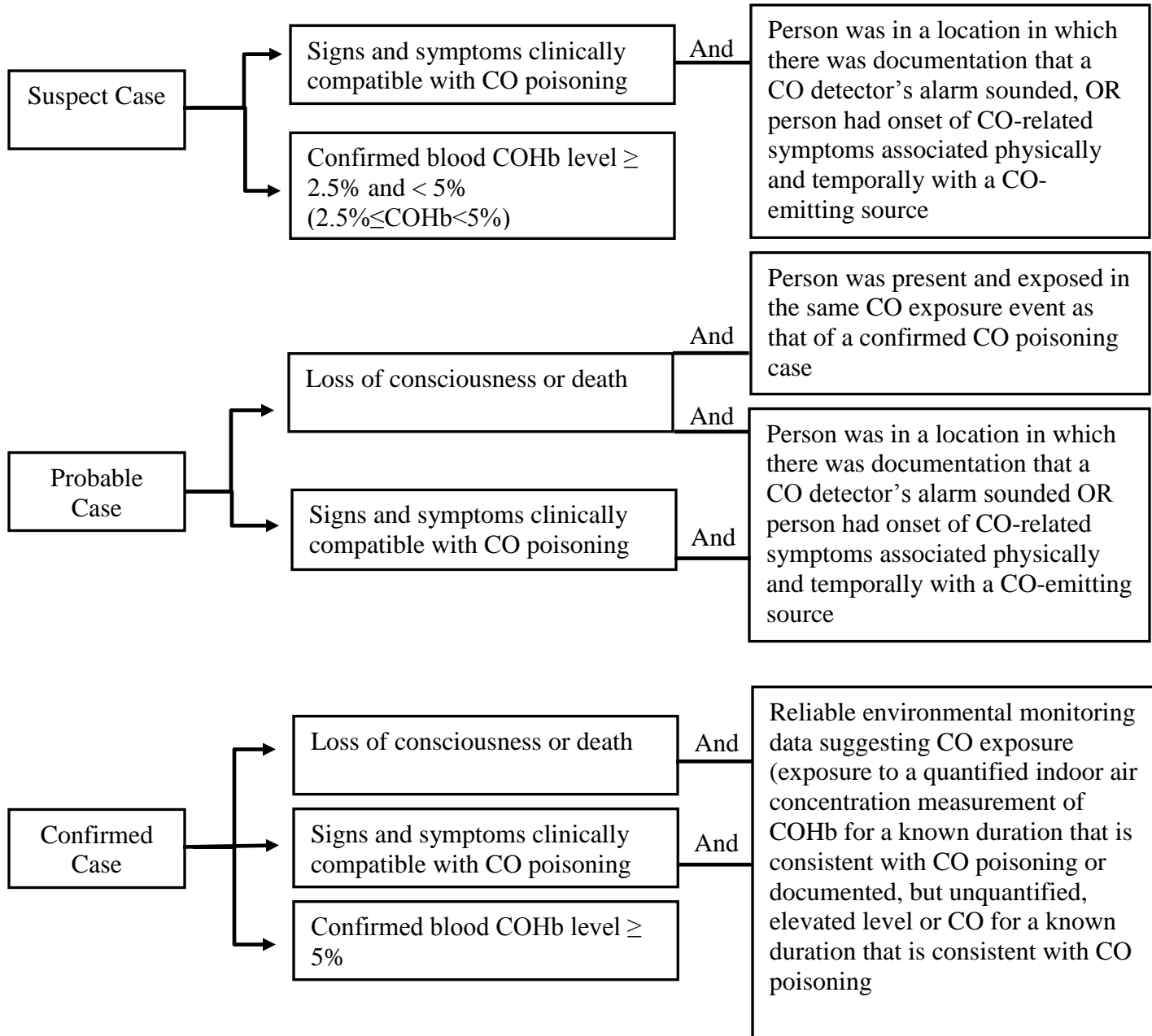
Once an investigation is complete, thought should be given to reaching out to partners that can help devise interventions to reduce the risk of another carbon monoxide poisoning event in the public location.

Site of Exposure	Anticipated Partners to Contact
Apartment Building	Local Health Department, Renter's Assistance, City Code Enforcement, Fire Marshal
Daycare	Childcare Licensing (KDHE)
Nursing Home	Kansas Department of Aging and Disability Services
Health Care Facility	Health Facilities Program (KDHE)
Correctional Facility	Jail – City, County, Local Health Department State Prison – Kansas Department of Corrections Federal Prison – Kansas Department of Corrections, Local Health Department
Hotel	Kansas Department of Administration
Shelter	Management at Shelter
School	Kansas Board of Education, School District, School, School Commissioners
Restaurant	Kansas Department of Administration
Occupational Setting	Kansas Department of Labor, OSHA
Lake/River	Kansas Department of Wildlife, Parks and Tourism
Recreational Area (park/campsite)	Kansas Department of Wildlife, Parks and Tourism, Park Management

REFERENCES

- 1) Centers for Disease Control and Prevention. Environmental Public Health Tracking Network. Carbon Monoxide Poisoning Mortality. Accessed From: www.cdc.gov/ephtracking. Accessed on 07/05/2018.
- 2) Ipbal S, Clower JH, Hernandez SA, Damon SA, and Yip FY. A Review of Disaster-Related Carbon Monoxide Poisoning: Surveillance, Epidemiology, and Opportunities for Prevention. 2012. *American Journal of Public Health*. 102(10): 1957-1963.
- 3) Centers for Disease Control and Prevention. Environmental Public Health Tracking Network. Health Effects Carbon Monoxide Poisoning Exposure and Risk – CDC Tracking Network. Accessed From: <https://ephtracking.cdc.gov/showCoRisk.action>. Accessed on 07/05/2018.

Appendix A: Carbon Monoxide Case Classification Algorithm, Person does not Smoke or Person Age < 14 with Unknown Smoking Status



Appendix B: Carbon Monoxide Case Classification Algorithm, Person Smokes or Person Age ≥ 14 with Unknown Smoking Status

